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05 SEP 2012

MEMORANDUM FOR Office of the Command Surgeon (LTC (b) (6)), U.S. Central Command, 7115 South Boundary Boulevard, MacDill Air Force Base, FL 33621-5101

SUBJECT: Deployment Occupational and Environmental Health Surveillance Sample Report, Airborne Particulate Matter, Bagram, Afghanistan, 25 November 2011-26 April 2012, U_AFG_BAGRAM_IP_A25_20120426

1. The enclosed report details the assessment of 13 valid particulate matter (PM) air samples collected by 61st Medical Detachment personnel, Bagram, Afghanistan, 25 November 2011-26 April 2012. Twenty-four samples were invalid primarily due to equipment failure.

2. The samples were collected for airborne PM less than 2.5 micrometers in diameter ($PM_{2.5}$) and analyzed for a set of metals typically found in PM. The $PM_{2.5}$ was identified as an acute hazard during the assumed exposure timeframe. Based on the samples and associated exposure information assessed in the enclosed report, the tactical risk estimate for $PM_{2.5}$ on both typical and peak exposure days during the sampled timeframe is **low**. No metals were identified as acute hazards.

FOR THE DIRECTOR:

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USAPHC
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Deployment Occupational and Environmental Health Surveillance Sample Report, U_AFG_BAGRAM_IP_A25_20120426 Health Risk Management Portfolio

Airborne Particulate Matter, Bagram, Afghanistan

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ACKNOWLEDGEMENTS

Deployment Occupational and Environmental Health Surveillance Sample Report Airborne Particulate Matter Bagram, Afghanistan 25 November 2011-26 April 2012 U_AFG_BAGRAM_IP_A25_20120426

1 References

See Appendix A for a list of references.

2 Purpose

This report provides the U.S. Army Public Health Command (USAPHC), Army Institute of Public Health (AIPH) assessment of the laboratory analytical results and exposure information associated with the samples collected by 61st Medical Detachment on 25 November 2011-26 April 2012 at Bagram, Afghanistan according to the U.S. Department of Defense deployment occupational and environmental health (DOEH) surveillance requirements. The assessment serves several purposes. It identifies DOEH hazards that may be related to acute health effects that could occur in personnel during their deployment. It provides an official record of observed exposure conditions for use in future site evaluations. It identifies whether or not there is a potential for chronic health concerns which may require additional characterization. Finally, this report includes preventive steps to reduce or eliminate occupational and environmental exposures and surveillance and/or sampling recommendations, as necessary.

3 Scope

The assessment of sample results and exposure information in this report follows the process published in the USAPHC Provisional (Prov) Technical Guide (TG) 230 "Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel, June 2010 Revision." The assessment is based on limited data representing a specific time period and assesses short-term exposure risks only. Therefore, this report cannot be used alone to estimate the risk of chronic health effects from exposures. In addition, this assessment does not address all DOEH hazards to which U.S. personnel may be exposed.

4 Laboratory Analysis

Filters used to collect deployment air samples of particulate matter (PM) are shipped to the USAPHC, AIPH and weighed to determine particulate mass and calculate ambient concentrations. The USAPHC, AIPH laboratory also analyzes the PM for a standard set of metals typically found in PM. The complete analytical sample results can be viewed in the Defense Occupational and Environmental Health Readiness System (DOEHRS). Log into the DOEHRS and search for the samples using the DOEHRS sample identification numbers (IDs) provided in Appendix B.

5 Exposure Setting

Table 2 contains information about the sampling location, environmental conditions, and associated potential population exposure. The information was provided on the field data sheets and/or exposure assessment worksheets submitted with the samples unless otherwise noted. Correction and clarification of exposure assumptions by the sampling unit is encouraged.

Table 2. Exposure Information

Questions About Exposure	Information Provided and Assumptions
Why was this sample/sample set collected?	Assess exposure to PM less than 2.5 micrometers in diameter ($PM_{2.5}$) and metals in the ambient air at this location.
What population is exposed and how?	All basecamp personnel breathe the ambient air. However, it is assumed that personnel spend part of each day indoors.
What is the timeframe under consideration?	Although personnel will be deployed to this location for approximately 1 year, only the timeframe of five months between the first and last sample dates is being assessed.
Where was the sample/sample set collected?	The samples were collected from the new burn pit, landfill guard tower and four corners.
What is known about location, activity, setting and potential sources of contamination that may affect exposure?	An active burn pit is located near the landfill where personnel conduct guard duty on the guard tower.

6 Prescreen

Table 3 shows whether parameters are identified as potential hazards because their peak single sample concentrations are greater than their most health-protective screening level USAPHC (Prov) TG 230 military exposure guidelines (MEGs). Potential hazards are further assessed to determine if they are acute hazards. Parameters analyzed but not shown in Table 3 are not considered hazards. The prescreening is conducted as described in USAPHC (Prov) TG 230, section 3.4.3. The sample results were compared to MEGs on 17 June 2012.

Table 3. Results of Prescreen

Parameter	Detections/Samples	Peak Single Sample Concentration ($\mu g/m^3$)	1-year Negligible MEG ($\mu g/m^3$)	Result
$PM_{2.5}$	13/13	124	15	Retain as potential hazard

Legend: $\mu g/m^3$ = micrograms per cubic meter

7 Acute Risk Assessment

7.1 Acute Screen

Table 4 shows whether parameters identified as potential hazards after prescreening are considered acute hazards because their peak sample day concentrations are greater than their acute screening MEGs. Acute hazards are further assessed to estimate the tactical risk from exposure to these parameters in the ambient air. The acute screening is conducted as described in USAPHC (Prov) TG 230, section 3.4.5.1.

Table 4. Results of Acute Screen

Parameter	Peak Sample Day Concentration ($\mu g/m^3$)	Screening MEG ($\mu g/m^3$)	Result
$PM_{2.5}$	124	24 hour Negligible MEG: 65	Retain as acute hazard

Legend: $\mu g/m^3$ = micrograms per cubic meter

7.2 Hazard Severity

Table 5 summarizes the hazard severity levels determined by comparing the peak and average sample day concentrations of the acute hazards to the appropriate MEGs. The peak concentration is intended to represent the worst exposure conditions and the average concentration is intended to represent typical exposure conditions. Hazard severity is determined using USAPHC (Prov) TG 230, section 3.4.5.2.

Table 5. Hazard Severity

Parameter	Concentration ($\mu g/m^3$)	Comparison MEGs ($\mu g/m^3$)	Hazard Severity
$PM_{2.5}$	Peak: 124	Is > 24-hour Negligible MEG: 65, but < 24-hour Marginal MEG: 250	Negligible
	Average: 72	Is > 24-hour Negligible MEG: 65, but < 24-hour Marginal MEG: 250	Negligible

Legend: $\mu g/m^3$ = micrograms per cubic meter

7.3 Hazard Probability

Table 6 summarizes the hazard probability determinations for each acute hazard. Refer to USAPHC (Prov) TG 230, section 3.4.5.3 for additional information about hazard probability scoring methodology.

Table 6. Hazard Probability Scoring for $PM_{2.5}$

Concentration ($\mu g/m^3$)	Hazard Probability Scoring for Exposure Factors				Hazard Probability
	Degree of Exposure	Represent-ativeness of Sample Data	Duration of Exposure	Rate of Exposure	
Peak: 124	Score 2: Concentration is at or between the 25th and 75th percentiles of the severity range.	Score 2: Field data adequately estimate population exposure during this timeframe.	Score 1: Field exposure duration to MEG exposure duration ratio is <1 (Personnel will not be exposed to the ambient air at this site for 24 continuous hours).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom
Average: 72	Score 1: Concentration is below the 25th percentile of the severity range	Score 2: Field data adequately estimate population exposure during this timeframe.	Score 1: Field exposure duration to MEG exposure duration ratio is <1 (Personnel will not be exposed to the ambient air at this site for 24 continuous hours).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom

Legend: $\mu g/m^3$ = micrograms per cubic meter

7.4 Tactical Risk Estimate

Table 8 summarizes the acute risk assessment for exposure to each of the acute hazards. The tactical risk estimate was determined using the USAPHC (Prov) TG 230, Table 3-1 "Military Risk Assessment Matrix." The tactical risk estimates are color-coded consistent with the black, red, amber, green system described in Department of the Army Field Manual 1-02 "Operational Terms and Graphics."

Table 8. Risk Assessment Summary

Parameter	Type of Exposure	Hazard Severity	Hazard Probability	Tactical Risk Estimate
$PM_{2.5}$	Peak	Negligible	Seldom	Low
	Average	Negligible	Seldom	

8 Conclusion

Based on the sample results and associated exposure information assessed in this report, the tactical risk estimate for $PM_{2.5}$ on both typical and peak exposure days during the sampled timeframe is low. No metals were identified as acute hazards. Refer to USAPHC (Prov) TG 230, Table 3-2 for the potential consequences to military operations and force readiness associated with this risk level.

9 Limitations

9.1 Field Data Quality

Field data provided with the samples were adequate.

Out of 37 samples, 24 were invalid primarily due to timer malfunctions and sampler flow differential.

9.2 Sample Receipt at USAPHC Laboratory

The sample set was packaged correctly.

9.3 Laboratory Data Quality

No laboratory data quality issues associated with this sample set were identified.

9.4 Risk Assessment

Parameter concentrations on days with multiple samples were averaged together to determine a single concentration for the day.

10 Recommendations and Notes

Maintain communication with USAPHC, AIPH points of contact (POCs) and continue standard surveillance of airborne PM and metals in accordance with defined Occupational and Environmental Health Site Assessment (OEHSA) Exposure Pathways and sampling plans for your location.

If an OEHSA and/or specific sampling plans have not yet been completed for Bagram, Afghanistan, collect ambient PM air samples from sites that best represent exposures at least once every 6 days to better characterize conditions over time.

11 Points of Contact

The USAPHC, AIPH POCs for this assessment are Mr. (b) (6) and Ms. (b) (6). Mr. (b) (6) may be contacted at e-mail (b) (6) and Ms. (b) (6) may be contacted at e-mail (b) (6), or DSN (b) (6) or commercial (b) (6).

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Appendix A

References

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Department of the Army. 2006. Field Manual 5-19, *Composite Risk Management.* https://rdl.train.army.mil/soldierPortal/atia/adlsc/view/public/23137-1/FM/5-19/TOC.HTM

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U.S. Army Public Health Command (Provisional). 2010. Technical Guide 230, *Chemical Exposure Guidelines for Deployed Military Personnel.* http://phc.amedd.army.mil/PHC%20Resource%20Library/TG230.pdf

Appendix B

Sample Identification Information

DOEHRS Sample ID	Sample ID Reported on Field Data Sheet	Sample Site	Date and Time Sample Collected	Sampling Duration	Sample Invalid (Yes/No) Reason for Invalid Sample
000067VL	AFG_BAGRAM_11329_PM25DPS	New Burn Pit	2011/11/25 1000	347.0 minutes	Yes, Timer Malfunction
000067VT	AFG_BAGRAM_11329_PM25DPS	Landfill Guard Tower	2011/11/25 1000	1072.0 minutes	Yes, Timer Malfunction
000067WI	AFG_BAGRAM_11330_PM25DPS	Landfill Guard Tower	2011/11/26 1000	1428.0 minutes	No
000067W0	AFG_BAGRAM_11330_PM25DPS	New Burn Pit	2011/11/26 1015	347.0 minutes	Yes, Timer Malfunction
000067XW	AFG_BAGRAM_11331_PM25DPS	Landfill Guard Tower	2011/11/27 1000	1086.0 minutes	Yes, Timer Malfunction
000067WW	AFG_BAGRAM_11331_PM25DPS	New Burn Pit	2011/11/27 1025	1082.0 minutes	Yes, Timer Malfunction
000067YE	AFG_BAGRAM_11332_PM25DPS	Landfill Guard Tower	2011/11/28 1015	1083.0 minutes	Yes, Timer Malfunction
000067YD	AFG_BAGRAM_11332_PM25DPS	New Burn Pit	2011/11/28 1025	1101.0 minutes	Yes, Timer Malfunction
0000683C	AFG_BAGRAM_11333_PM25DPS	Landfill Guard Tower	2011/11/29 1029	1011.0 minutes	Yes, Timer Malfunction
0000682F	AFG_BAGRAM_11333_PM25DPS	New Burn Pit	2011/11/29 1053	1363.0 minutes	No
00006838	AFG_BAGRAM_11333_PM25DPS	New Burn Pit	2011/11/29 1053	1363.0 minutes	No
00006849	AFG_BAGRAM_11334_PM25DPS	Landfill Guard Tower	2011/11/30 1019	498.0 minutes	Yes, Timer Malfunction
0000683I	AFG_BAGRAM_11334_PM25DPS	New Burn Pit	2011/11/30 1036	707.0 minutes	Yes, Timer Malfunction
000067E8	AFG_BAGRAM_11335_PM25DPS	Landfill Guard Tower	2011/12/01 1010	1424.0 minutes	Yes, Flow Differential
000067EL	AFG_BAGRAM_11335_PM25DPS	New Burn Pit	2011/12/01 1025	1435.0 minutes	No
000067HC	AFG_BAGRAM_11336_PM25DPS	Landfill Guard Tower	2011/12/02 1006	1439.0 minutes	Yes, Flow Differential
000067GV	AFG_BAGRAM_11336_PM25DPS	New Burn Pit	2011/12/02 1026	1123.0 minutes	No
000067FS	AFG_BAGRAM_11337_PM25DPS	Landfill Guard Tower	2011/12/03 1011	1485.0 minutes	Yes, Flow Differential
000067FW	AFG_BAGRAM_11337_PM25DPS	New Burn Pit	2011/12/03 1025	1447.0 minutes	Yes, Damaged Sampling Media

DOEHRS Sample ID	Sample ID Reported on Field Data Sheet	Sample Site	Date and Time Sample Collected	Sampling Duration	Sample Invalid (Yes/No) Reason for Invalid Sample
000067I7	AFG_BAGRAM_11338_PM25DPS	Landfill Guard Tower	2011/12/04 1013	1411.0 minutes	Yes, Flow Differential
000067I6	AFG_BAGRAM_11338_PM25DPS	New Burn Pit	2011/12/04 1031	1415.0 minutes	No
000067JH	AFG_BAGRAM_11339_PM25DPS	Landfill Guard Tower	2011/12/05 1000	1151.0 minutes	Yes, Flow Differential
000067J4	AFG_BAGRAM_11339_PM25DPS	New Burn Pit	2011/12/05 1013	1097.0 minutes	Yes, Timer Malfunction
000067K1	AFG_BAGRAM_11340_PM25DPS	Landfill Guard Tower	2011/12/06 1000	476.0 minutes	Yes, Timer Malfunction
000067JK	AFG_BAGRAM_11340_PM25DPS	New Burn Pit	2011/12/06 1022	1808.0 minutes	Yes, Timer Malfunction
0000684N	AFG_BAGRAM_11341_PM25DPS	Landfill Guard Tower	2011/12/07 1025	1527.0 minutes	Yes, Timer Malfunction
0000684D	AFG_BAGRAM_11341_PM25DPS	New Burn Pit	2011/12/07 1105	1582.0 minutes	Yes, Timer Malfunction
00006UBY	AFG_BAGRAM_12069_PM25DPS	Landfill Guard Tower	2012/03/09 1500	857.0 minutes	Yes, Sample Malfunction
00006UCB	AFG_BAGRAM_12069_PM25DPS	New Burn Pit	2012/03/09 1500	1440.0 minutes	No
00006UCD	AFG_BAGRAM_12069_PM25DPS	Warrior Base Camp	2012/03/09 1500	1440.0 minutes	No
00006UJO	AFG_BAGRAM_12100_PM25DPS	Landfill Guard Tower	2012/04/09 1025	1440.0 minutes	No
00006UD0	AFG_BAGRAM_12100_PM25DPS	Four Corners	2012/04/09 1140	1440.0 minutes	No
00006UJ5	AFG_BAGRAM_12100_PM25DPS	Warrior Base Camp	2012/04/09 1210	565.0 minutes	Yes, Sample Malfunction
00006UMB	AFG_BAGRAM_12111_PM25DPS	Landfill Guard Tower	2012/04/20 0950	1440.0 minutes	No
00006UM3	AFG_BAGRAM_12111_PM25DPS	Four Corners	2012/04/20 1015	1440.0 minutes	No
00006UN2	AFG_BAGRAM_12118_PM25DPS	Landfill Guard Tower	2012/04/26 1015	1440.0 minutes	No
00006UN6	AFG_BAGRAM_12118_PM25DPS	Four Corners	2012/04/26 1035	373.0 minutes	Yes, Sample Malfunction
000067VL	AFG_BAGRAM_11329_PM25DPS	New Burn Pit	2011/11/25 1000	347.0 minutes	Yes, Timer Malfunction